**IN THE UNITED STATES DISTRICT COURT FOR
THE NORTHERN DISTRICT OF GEORGIA
ATLANTA DIVISION**

DONA CURLING, et al. **Plaintiff,** **vs.** **BRAD RAFFENSPERGER, et al.** **Defendant.**	**CIVIL ACTION FILE NO.: 1:17-cv-2989-AT**

SUPPLEMENTAL DECLARATION OF KEVIN SKOGLUND

KEVIN SKOGLUND declares, under penalty of perjury, pursuant to

28 U.S.C. § 1746, that the following is true and correct:

1. I hereby incorporate my previous declarations as if fully stated herein. I
   have personal knowledge of all facts stated in this declaration, and if
   called to testify, I could and would testify competently thereto.

2. I have read the Letter Report regarding "Dominion Voting Systems ICX
   Version 5.5.10.32" from Pro V&V to Michael Barnes dated October 2,
   2020 ("Letter Report").

3. The Letter Report describes Pro V&V's evaluation of a proposed code
   change by Dominion to address a flaw in the current ICX software
   related to reliably displaying two columns of candidates.

4. Pro V&V's evaluation is inadequate to verify Dominion's opinion of the root cause of the error, Dominion's proposed fix for the error, or whether the nature of the proposed change is considered "de minimis" as defined by the U.S. Election Assistance Commission ("EAC").

High Impact Changes

5. The Letter Report describes changes that are potentially high impact.

6. I expected the change to be limited to one or two lines in a configuration file based its description in the hearings. A configuration file change would provide a new value for the existing code to use.

7. The impact of changing a value being *used* by code is far less than the impact of changing the code *itself*, in the same way that changing the furniture in a house has less impact than moving walls. The value may be different but it will travel the same pathways through the code during operation. The structure and governing rules are unchanged.

8. Instead, the Letter Report describes two sets of changes to the source code *itself* in a total of five files. It does not quantify the number of lines changed, but it must be at least five. These are not merely configuration changes. Variable and function definitions in the source code are changed.

9. The changes described may sound minor, for example changing a variable from an integer (e.g., 123) to a string (e.g., "123"), but I would give them no less consideration. I have broken plenty of code making similar changes.

10. One reason is that any code elsewhere in the program that uses a changed variable or function could be impacted. Another part of the code may act correctly when given 123 but act incorrectly when given "123". The first can have numbers added and subtracted, while the second can be searched for a specific character, but the reverse is often not true.

11. The Letter Report describes a source code review limited to the changed lines of source code. The code comparison performed is similar to reviewing the changed text in a legal blackline. It does not appear that Pro V&V looked throughout the source code for other interactions which could prove problematic.

12. The Letter Report states that Dominion believes the problem is a collision of resource identifiers between their software and the underlying operating system. I think it's a fair analogy to say that Dominion's software and the operating system sometimes try to park in the same parking space.

13. In my experience, an abundance of caution is necessary when the operating system and software running on it are working in a shared

space and not playing well together. A misstep could create additional problems in their interactions and any change should be carefully considered and well tested.

14. The Letter Report does not describe any review of the proposed software's interaction with the operating system. It does not mention the involvement of any expert on the operating system or an opinion regarding colliding resource identifiers—the reported cause and the target of the resolution. This is a concerning oversight.

Inadequate Testing of the Root Cause of the Error

15. Pro V&V was unable to reliably reproduce the error with the current version of the software, ICX 5.5.10.30. In fact, they reported producing the error only once out of 810 total attempts.

16. Pro V&V appears to have taken Dominion's word for the root cause of the error. The Letter Report does not mention any independent investigation to determine the cause.

17. The description of Pro V&V's first test, using a sample election database, begins with a procedure likely suggested by Dominion—toggling between font sizes to trigger the error. When the 10th toggle produced the error, Pro V&V considered the root cause to be confirmed. That is in itself not unreasonable.

18. However, the same test procedure was later performed using an actual election database, from Douglas County where logic and accuracy testing had revealed the error previously, and 400 toggles and several reboots could not produce the error. Of two test cases that should have both failed, one failed and one did not.

19. Despite these conflicting test results, Pro V&V did not investigate further. They did not consider what might be different between these two test cases to cause contradictory results. They did not consider if the sample election database at the center of their tests was a poor substitute for a real database. They did not consider that the root cause could be different, or that toggling the font size might not be a good trigger for the error.

20. Pro V&V wrote the Letter Report without having confirmed that Dominion's opinion of the root cause was correct.

Inadequate Testing of the Proposed Fix for the Error

21. It is impossible to verify that a proposed change sufficiently addresses an error if the root cause is unconfirmed. A change may only appear to fix the error due to coincidence. Correlation is not causation. A change may incompletely fix the error or create subtle side effects.

22. I have learned this lesson many times while fixing software bugs during my 23 years as a programmer, and I teach that lesson in a course on

software testing. I have also had the practical experience of taking a car to the auto mechanic over and over as they try different solutions for an uncertain cause.

23. Pro V&V's basis for determining that the error was fully resolved by the proposed change, ICX 5.5.10.32, was that the error was not observed after 400 toggles and several reboots.

24. This is not an ideal test case because "absence of evidence is not evidence of absence." The conclusion requires an assumption that subsequent attempts would not surface the error. Given that the first test required only 10 toggles to trigger the error, after 400 toggles and several reboots I might have made a similar assumption.

25. However, when Pro V&V performed the subsequent test on the Douglas County database and also could not observe the anticipated error after 400 toggles and several reboots, they did not revisit their conclusion about ICX 5.5.10.32. They should have.

26. They did not consider that the error could be eluding them in ICX 5.5.10.32 as it was with ICX 5.5.10.30 using Douglas County's database. They did not consider that their assumption that 400 toggles was enough to surface the error was wrong. They did not consider that the proposed change might be an insufficient remedy for the problem.

27. To be clear, I am not suggesting that Dominion's opinion of the root cause is incorrect or that Dominion's proposed change does not fix it. I am saying that testing was insufficient to verify either one. Pro V&V showed no skepticism about their findings when the results created a logical fallacy.

28. Even more surprising, Pro V&V had a real election database from Douglas County in hand, yet they did not test it with ICX 5.5.10.32. The stated purpose of this eleventh-hour software change was to resolve this error for the current election database, rather than create and distribute a new one. The test lab hired to confirm that the new software will work with the current database in a matter of days did not even check.

29. Pro V&V wrote the Letter Report without having confirmed that Dominion's proposed fixed correctly addressed the error, neither on the sample election database nor on the election county database counties are planning to use.

Inadequate Testing of "De Minimis"

30. The EAC defines a de minimis change as:

    A de minimis change is a change to a certified voting system's hardware, software, TDP, or data, the nature of which will not materially alter the system's reliability, functionality, capability, or

operation. Under no circumstances shall a change be considered de minimis if it has reasonable and identifiable potential to impact the system's performance and compliance with the applicable voting Standard.[1]

31. The Letter Report does not describe any testing to demonstrate that the nature of the proposed change does not "materially alter the system's reliability, functionality, capability, or operation" and does not have a "reasonable and identifiable potential to impact the system's performance and compliance with the applicable voting Standard."

32. Pro V&V ignored these critical, foundational requirements in their testing.

33. Pro V&V did not test whether *any* other functionalities of the device are impacted. They did not test whether the new build of the software correctly selects candidates in a series of contests and accurately prints them on a ballot. They did not test other screens to ensure that a fix to the two-column layout did not break another. They did not check if it was still possible to change languages or screen contrast, or whether the audio ballot, used by voters with disabilities, was still working. They did not test whether the device's security was impacted.

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[1] "Testing and Certification Program Manual," Section 3.4.2, available at: https://www.eac.gov/sites/default/files/eac_assets/1/6/Cert_Manual_7_8_15_FINAL.pdf

34. Pro V&V did not answer the litmus test for de minimis. Does the change materially alter the system's reliability, functionality, capability, or operation?

35. The Letter Report describes "functional regression testing," which might help answer this question, but it misuses the term.

36. Regression testing is a "re-running functional and non-functional tests to ensure that previously developed and tested software still performs after a change."[2] It is so named because a regression is a step backwards in the development of software, the proverbial "two steps forward, one step back."

37. Pro V&V examined the rendering of the two-column layout in their tests. Regression testing would validate that *other* parts of the software still perform correctly.

38. Regardless of Pro V&V's determination, this change is not a de minimis change until the EAC reviews it and approves in writing. "The EAC has sole authority to determine whether any VSTL endorsed change constitutes a de minimis change under this section. The EAC will inform the Manufacturer and VSTL of its determination in writing."[3]

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[2] "Regression Testing", Wikipedia, available at https://en.wikipedia.org/wiki/Regression_testing

[3] "Testing and Certification Program Manual," Section 3.4.3

39. The EAC prohibited *any* software changes to be considered de minimis until recently out of concern that even small changes might alter the system functionality, due to potential ripple effects I described earlier.

40. Given that the process is new, I expect that the EAC will scrutinize any request for a software de minimis change carefully. I expect the EAC to ask for more rigorous testing and reporting than the Letter Report.

Concerns about the Time Remaining for Review and Testing

41. In my previous declaration I expressed concern about a software change at this late date and fear that time pressures may result in less thorough review and testing of the proposed change.

42. The Letter Report is a wholly inadequate review. Its tests are incomplete.

43. The EAC has not yet begun to review this proposed software change. Using the revised software without the EAC's approval will void the federal certification. EAC approval must be granted in the next five business days to allow early voting to commence on the following Monday.

44. Yet the uncertified software has been distributed and counties have been instructed to install it on over 30,000 ImageCast X devices and to begin testing them.

45. Last week, I heard Michael Barnes describe the current procedures for logic and accuracy testing. The procedures do not test every device, for every ballot style, for every candidate. The procedures do not include any additional testing related to this error. This problem and others could pass through logic and accuracy testing undetected.

Executed on this date, October 4, 2020.

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Kevin Skoglund